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Catamblyrhynchus and *Paradoxornis:* an unremarked instance of convergence in bill morphology for feeding on bamboo

by Storrs L. Olson

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Regular work in a major museum inevitably results in serendipitous discoveries which there may be no opportunity to investigate in detail. The following observations report one such revelation and are offered in the hope that they will stimulate further research.

The Plush-capped Finch *Catamblyrhynchus diadema* is a peculiar member of the New World 9-primaried oscines (Fringillidae in its broadest sense) that occurs in the Andes of South America from Venezuela to Bolivia. Its more precise relationships have remained obscure and it was long carried in its own family, Catamblyrhynchidae, thought to be allied to the tanagers (Thraupidae *auct.*). It is characterized by a distinctive, short, wedge-like bill with a flattened culmen, and a bright yellow cap of plush, bristly feathers. Almost nothing was known of the habits of *Catamblyrhynchus* until Hilty *et al.* (1979) showed it to be strongly associated with stands of bamboo, in which the birds "forage on bamboo stalks by clinging upright, vertically, or upside down, adopting these chickadee (*Parus*)-like postures with versatility. They press their short swollen bill directly into the axiles of dense leaf whorls at each node, sometimes tugging

vigorously, or running the bill along the bamboo stems with a series of tiny biting motions''. Hilty *et al.* reported the contents of 3 stomachs as containing ''small bits of bamboo leaf,'' ''vegetable matter,'' and ''insect remains''.

After reading this account, curiousity led me to examine skeletons of *Catamblyrhynchus* to see what the underlying structure associated with such a distinctive feeding method might be. Examination of skulls of *Catamblyrhynchus* recalled a similar configuration I had seen in some other species, which eventually led me back to the largely Himalayan genus *Paradoxornis,* the so-called parrotbills, in which the overall morphology of the skull in several species is strikingly similar to that of *Catamblyrhynchus.* Although there is considerable diversity in bill shape among the different species of *Paradoxornis,* in some, especially the smaller ones such as *P. fulvifrons, P. poliotus* and *P. gularis,* the external morphology of the bill closely resembles that of *Catamblyrhynchus.* It was then most interesting to find that the members of the genus *Paradoxornis* as a whole are almost always reported as being associated with bamboo, in which they forage in an active tit-like manner (Ali 1962; Ali & Ripley 1971). With such similar feeding adaptations and habitat predilictions, at least some of the species of *Paradoxornis* may be assumed to feed in a similar manner and on similar food to that taken by *Catamblyrhynchus.*

As in the case of *Catamblyrhynchus,* the 17 species of *Paradoxornis,* with their larger relative *Conostoma,* which is also associated with bamboo, have often been segregated in their own family, Paradoxornithidae, and in the past they have been allied with the Corvidae, Paridae or Timaliidae (Stuart Baker 1922). In most recent classifications they are placed among the Timaliidae, in which Deignan (1964) included them with *Panurus* as a subfamily Panurinae. Regardless of their origins, *Paradoxornis* and *Conostoma* belong somewhere among the ''Old World insect-eating'' oscines and are not closely related to the New World 9-primaried group. Therefore, the clear similarity in feeding adaptations between *Paradoxornis* and *Catamblyrhynchus* must be due purely to convergence.

Catamblyrhynchus has been thought to be related either to the tanagers (Thraupinae) or the emberizine finches (Emberizinae). Its plumage pattern and coloration (clear grey above, dark chestnut below, rufous superciliary) are suggestive of certain other high Andean genera of 9-primaried oscines such as *Poospiza (Compsospiza) garleppi* (Emberizinae), *Hemispingus rufosuperciliaris* (Thraupinae), *Conirostrum rufum* (''Coerebidae''), and *Oreomanes frazeri* (''Coerebidae''). A closer affinity than is usually admitted has already been suggested for some of these genera (Olson, *in* Wetmore *et al.* 1984: 498; Schulenberg 1985), and *Catamblyrhynchus* may perhaps belong to a montane radiation of birds with very divergent feeding adaptations that have obscured their origins, as feeding adaptations are notoriously poor indicators of relationships among passerines (e.g. see Olson & Ames 1984).

In order to understand how the feeding adaptations of *Catamblyrhynchus* and *Paradoxornis* may have evolved, it is necessary to determine their closest relatives more precisely. For example, did the ancestors of *Paradoxornis* have a bill morphology similar to that of the ancestors of *Catamblyrhynchus,* or did each evolve their convergent similarities from ancestors that had significantly different feeding adaptations from one another? Research is also called for to determine precisely how the feeding adaptations of *Catamblyrhynchus* and the

various species of *Paradoxornis* are used.

Catamblyrhynchus has evolved a key adaptation that has not led to subsequent radiation, yet in the paradoxornithines an apparently similar adaptation has given rise to a fairly large radiation of species, some with modifications of the bill that depart rather significantly from the *Catamblyrhynchus* type. Thus, within the paradoxornithines, the full extent of morphological divergence and radiation needs to be explored to ascertain which forms are primitive and which may secondarily have evolved further specializations.

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Recent work on the origin and suppression of bird species in the Cape Verde Islands, especially the shearwaters, the herons, the kites and the sparrows

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When Charles Darwin visited the Cape Verde Islands in January 1832 at the beginning of his voyage in H.M.S. *Beagle,* he collected 2 sparrows, one of which appears to be native to the islands, and the other a recent arrival from the north. When he later began to speculate about the remarkable wildlife of the Galapagos, where sparrows are replaced by an array of endemic finches, he compared the Galapagos with the geographically similar but biologically less remarkable North Atlantic islands (especially Madeira and Bermuda, which were better known), and concluded that the peculiar features of the Galapagos must be due to their greater isolation, since variation is likely to be suppressed at accessible sites by the continual immigration of mainland forms (Darwin 1861).

Although it is now known that a number of remarkable endemic forms have been lost from the Atlantic Islands following the arrival of man, as recently reported by Pieper (1985) for Madeira, Darwin's main conclusions still appear